Claims

1. A method of producing metallic and intermetallic alloy ingots by continuous or quasi-continuous billet withdrawal from a cold wall induction crucible, characterized in that the alloy material is supplied in a molten and pre-homogenized state continuously or quasi-continuously to a cold wall induction crucible.

2. A method according to claim 1, characterized in that inter-metallic γ-TiAl-based alloy ingots are produced.

3. A method according to claim 1 and 2, characterized in that the alloys are described by the following summation formula:
$Ti_xAl_y(Cr,Mn,V)_u(Zr,Cu,Nb,Ta,Mo,W,Ni)_v(Si,B,C,Y)_w$
with the concentrations of the alloying constituents being within the following ranges (in atomic percent):
$x = 100-y-u-v-w$
$y = 40$ to 48, preferably 44 to 48
$u = 0.5$ to 5
$v = 0.1$ to 10 and
$w = 0.05$ to 1.

4. A method of producing metallic and intermetallic alloy ingots of high homogeneity and low porosity of any adjustable diameter according to claim 1, characterized in that it is based on the following sequence:

(i) producing electrodes by customarily mixing and compressing the selected starting materials;

(ii) at least once remelting the electrodes obtained in step (i) in a conventional fusion-metallurgical process;

(iii) inductively melting off the electrodes obtained in steps (i) and (ii) in a high frequency coil;

(iv) homogenizing the pre-homogenized, molten material obtained in step (iii) in a cold wall induction crucible; and

(v) withdrawing the melt, solidified by cooling, from the cold wall induction crucible of step (iv) in the form of solidified ingots of freely adjustable diameters and lengths.

5. A method according to claim 1, characterized in that it is based on the following sequence:

(i) producing electrodes by conventionally mixing and compressing the selected starting materials;

(ii) at least once melting the electrodes obtained in step (i) by a conventional fusion-metallurgical method;

(iii) producing a pre-homogenized, molten material of the electrode material obtained in step (ii) by melting off in a cold crucible plasma furnace;

(iv) homogenizing the pre-homogenized, molten material obtained in step (iii) in a cold wall induction crucible; and

(v) withdrawing the melt, solidified by cooling, from the cold wall induction crucible of step (iv) in the form of cylindrical ingots of freely adjustable diameters and lengths.

6. A method according to claims 1 to 4, characterized in that the melting process for producing the pre-homogenized, molten material takes place in a high frequency field of a frequency in the range of 70 to 300 kHz.

7. A method according to claims 1 to 4, characterized in that the temperature of the pre-homogenized, molten material ranges between 1400 to 1600°C.

8. A method according to claims 1 to 4, characterized in that the electrodes (iii) used for producing the molten, pre-homogenized material by means of an induction coil rotate preferably at a speed between 2 and 5 rpm.

9. A method according to claims 1 to 4, characterized in that the method is executed quasi-continuously by one or several electrodes, in case of inductive melting, being quasi-continuously fed while an ingot is simultaneously withdrawn from the cold wall induction crucible.

10. A method according to claims 1 to 4, characterized in that homogenization in the cold wall induction crucible in step (iv) takes place at a temperature of 1400 to 1700°C.

11. A method according to claims 1 to 4, characterized in that homogenization in the cold wall induction crucible in step (iv) takes place in a range of frequency of 4 to 20 kHz.

12. A method according to claims 1 to 4, characterized in that cooling the melt upon ingot withdrawal in step (v) takes place by the aid of water-cooled copper segments.

13. A method according to claims 1 to 4, characterized in that the diameter of the ingots withdrawn in step (v) is in the range of 40 to 350 mm.

14. γ-TiAl-based alloy ingots produced according to claims 1 to 3, characterized by

(a) a length to diameter ratio of > 12;

(b) homogeneity related to local macroscopic fluctuations of the aluminum and titanium of maximally ± 0.5 atomic percent; further metallic alloying constituents of maximally ±0.2 atomic percent; non-metallic alloying additions (boron, carbon, silicon) of maximally ± 0.05 atomic percent.